Third United Nations International Conference on the Peaceful Uses of Atomic Energy

A/CONF.28/A/608
SWEDEN
February 1964
Original: ENGLISH

Confidential until official release during Conference

Abstract

Fuel Development for Swedish Heavy Water Reactors

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Recent development work on uranium oxide fuel elements for use in the Swedish heavy water reactors, i. e. Ågesta (in operation 1964) and Marviken (scheduled for operation 1968), is reviewed. Development trends for the fuels of possible future heavy water reactor projects are indicated.
In comparison with the Ågesta reactor, certain improvements in performance and design are proposed for Marviken which together with progress in fabrication procedure are expected to significantly reduce the fuel costs.
The fuel assembly design is characterized by the adoption of long fuel rods and rod spacers constituting a grid. With a slight enrichment of 1.3 %, a burn up figure of around 13,000 Mwd/t is foreseen for the Zircaloy-canned boiler fuel elements of the Marviken reactor. Fabrication costs are given.
The development programme includes in-pile and out-of-pile experiments on prototype fuel elements as well as investigations on some fundamental properties of the uranium oxide fuel and of the Zircaloy canning material.
In particular, results of investigations on the heat conductivity and the substoichiometric composition of the uranium dioxide are reported as are also experimental investigations on the hydrogen embrittlement of Zircaloy.
Available resources including loop facilities in the Studsvik materials testing reactor R2 are described.
In the last year the development work has been largely concerned with super heat fuel elements for possible use in the Marviken reactor and, in particular, with super heat canning materials of Fe-Cr-Ni alloys.
Some preliminary data are reported.

The fuel development work associated with the long range use of recycled plutonium in the Swedish heavy water reactors is also commented upon.